

What is claimed is:

1 <sup>50</sup><sub>a</sub> 1. An optical communication system for amplifying an  
2 optical signal propagating through an optical transmission line  
3 by using an optical amplifier in an optical repeater and emitting  
4 an amplified optical signal to an optical transmission line  
5 mounted at a back stage comprising:

6           a transmission line compensating device to generate control  
7 light for producing a Raman amplification effect within said  
8 optical transmission line based on a control signal superimposed  
9 on said optical signal.

1           2.     The optical communication system according to Claim  
2     1, wherein said transmission line compensating device is so  
3     configured as to send said control light to an optical  
4     transmission line mounted at a front stage.

1           3.     The optical communication system according to Claim  
2     1, wherein said transmission line compensating device is so  
3     configured as to send said control light to said optical  
4     transmission line mounted at said back stage.

1           4.     The optical communication system according to Claim  
2     1, wherein said transmission line compensating device is mounted  
3     inside said optical repeater.

1           5.     The optical communication system according to Claim  
2     1, wherein said transmission line compensating device is  
3     separately and individually outside said optical repeater.

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1           6.       The optical communication system according to Claim  
2   1, wherein said transmission line compensating device includes  
3   two or more control light sources to generate control light having  
4   a different wavelength and output and an optical multiplexer to  
5   multiplex said control light fed from said two or more control  
6   light sources.

1           7.       An optical communication system for amplifying an  
2       optical signal propagating through an upward transmission line  
3       or a downward transmission line by using a corresponding optical  
4       amplifier in an optical repeater and sending an amplified optical  
5       signal to an upward transmission line or a downward transmission  
6       line mounted at a back stage comprising:

7 transmission line compensating devices each operating for  
8 said upward transmission line or said downward transmission line  
9 and each generating, based on a control signal superimposed on  
10 said optical signal, control light which causes a Raman  
11 amplification effect in said optical transmission lines.

1           8.     The optical communication system according to Claim  
2     7, wherein said transmission line compensating devices are so  
3     configured as to send said control light to optical transmission  
4     lines mounted at a front stage.

1           9.     The optical communication system according to Claim  
2     7, wherein said transmission line compensating devices are so  
3     configured as to send said control light to said optical  
4     transmission lines mounted at said back stage.

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1           10.   The optical communication system according to Claim  
2 7, wherein said transmission line compensating devices are  
3 mounted inside said optical repeater.

1           11.   The optical communication system according to Claim  
2 7, wherein said transmission line compensating devices are  
3 separately and individually mounted outside said optical  
4 repeater.

1           12.   The optical communication system according to Claim  
2 7, wherein said transmission line compensating devices include  
3 two or more control light sources to generate control light having  
4 a different wavelength and output and an optical multiplexer to  
5 multiplex said control light fed from said two or more control  
6 light sources.

1           13.   The optical communication system according to Claim  
2 7, further comprising common circuits each controlling  
3 simultaneously said transmission line compensating devices each  
4 operating to correspond to said upward transmission line or said  
5 downward transmission line.

1           14.   An optical repeater for amplifying an optical signal  
2 propagating through an optical transmission line by using an  
3 optical amplifier and sending an amplified optical signal to an  
4 optical transmission line mounted at a back stage comprising:  
5           a transmission line compensating device to generate, based  
6 on a control signal superimposed on said optical signal, control  
7 light which causes a Raman amplification effect within said

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8 optical transmission line.

1 15. The optical repeater according to Claim 14, wherein  
2 said transmission line compensating device is so configured as  
3 to send said control light to an optical transmission line mounted  
4 at a front stage.

1 16. The optical repeater according to Claim 14, wherein  
2 said transmission line compensating device is so configured as  
3 to send said control light to said optical transmission line  
4 mounted at a back stage.

1 17. The optical repeater according to Claim 14, wherein  
2 said transmission line compensating device is mounted inside said  
3 optical repeater.

1 18. The optical repeater according to Claim 14, wherein  
2 said transmission line compensating device is separately and  
3 individually mounted outside said optical repeater.

1 19. The optical repeater according to Claim 14, said  
2 transmission line compensating device includes two or more  
3 control sources to generate control light having a different  
4 wavelength and output and an optical multiplexer to multiplex said  
5 control light fed from said two or more control light sources.

1 20. An optical repeater for amplifying an optical signal  
2 propagating through an upward transmission line or a downward  
3 transmission line by using a corresponding optical amplifier and

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4 sending an amplified optical signal to an upward transmission line  
5 mounted at a back stage or a downward transmission line mounted  
6 at a back stage comprising:  
7 transmission line compensating devices each operating for  
8 said upward transmission line or said downward transmission line  
9 and each generating, based on a control signal superimposed on  
10 said optical signal, control light which produces a Raman  
11 amplification effect within said upward transmission line or said  
12 downward transmission line.

21. The optical repeater according to Claim 20, wherein  
said transmission line compensating devices are so configured as  
to send said control light to an optical transmission line mounted  
at a front stage.

22. The optical repeater according to Claim 20, wherein  
said transmission line compensating devices are so configured as  
to send said control light to said optical transmission line  
mounted at said back stage.

1           23.    The optical repeater according to Claim 20, wherein  
2   said transmission line compensating devices are mounted inside  
3   said optical repeater.

1           24.    The optical repeater according to Claim 20, wherein  
2   said transmission line compensating devices are separately and  
3   individually mounted outside said optical repeater.

1            25.    The optical repeater according to Claim 20, said

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2 transmission line compensating devices includes two or more  
3 control sources to generate control light having a different  
4 wavelength and output and an optical multiplexer to multiplex said  
5 control light fed from said two or more control light sources.

1 26. The optical repeater according to Claim 20, further  
2 comprising common circuits each controlling simultaneously said  
3 transmission line compensating devices each operating to  
4 correspond to said upward transmission line or said downward  
5 transmission line.

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